Evaluating The Efficacy of Multimodal Physiotherapy In Patients With Idiopathic Facial Palsy Based On Their Electroneurographic Quotient

A Synopsis

Submitted in

Partial Fulfilment for the Degree of

Doctor of Philosophy

Physiotherapy (Neurology)

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2022

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Consent Form For Patients/Gaurdians To Participate In The Study On "Evaluating The Efficacy Of Multimodal Physiotherapy In Patients With Idiopathic Facial Palsy Based On Their Electroneurographic Quotient"

Information to the participants:

Your/Your daughter's/son's clinical evaluation suggests that you/ your ward are suffering from Idiopathic Facial Nerve Palsy disease. Idiopathic facial nerve palsy (VII) is sudden, unilateral peripheral facial nerve palsy. Symptoms of facial nerve palsy are hemifacial paresis of the upper and lower face. This research focuses on the motor recovery of your/ your ward's peripheral facial paresis. In the scientific literature, there is dearth of information regarding rehabilitative technique that has clearly proven itself or superior to another, for lack of therapeutic trials of sufficient quality.

The objective of this study is to compare the effectiveness of rehabilitation programs for peripheral facial paresis as per the degree of facial nerve damage. To answer this question, 100 people with unilateral peripheral facial paresis will be included in our centre located in Patna. In this study we are planning to give you/ your ward a tailored physiotherapy protocol based on clinical and qualitative and quantitative evaluation of Facial nerve. These tests will be done to obtain insights to guide further physiotherapy protocol for early recovery and with minimal or no occurrence of side effects like facial synkinesis and hemifacial spasms. You will undergo a MRI as part of the study. It will require 1 hr of your time. You will also have to undergo electrophysiological tests at your/ your ward's 1st visit, then 10-14 days after onset of your/ your ward's disease and subsequently every 21 days or till recovery. Various physiotherapeutic options include Facial muscle ultrasound, Facial neuromuscular retraining, Facial electrical stimulation, Facial massage, and Facial taping, mirror therapy and motor imagery.

The estimated duration of the research is approximately 6 months.

The study does not cause any long-term risk. There is no radiation or any other harmful effects in the procedure. However you may have some inconvenience due to miniature currents applied while recording. Your/ your ward's treatment will not be altered for the sake of this study. If we obtain any new information it will be intimated to you. The results of the study will be kept strictly confidential.

In Undertaking by the investigator:

Your consent to participate in the above study is sought. You have the right to refuse consent or withdraw the same during any part of the study without giving any reason.

Irrespective of your participation in the study, you will continue to receive the required care, without any prejudice. If you have any doubts about the study, please feel free to clarify the same. Even during the study, you are free to contact any of the members of the study team for clarification if you so desire. All the information/data collected will be confidential.

Informed Consent Form:

I have no objection in undergoing this investigation, which may be helpful in further understanding about the physiotherapeutic management of the disease. I/ my ward have been informed that I/ my ward will be subject to MRI , Electrophysiological study of facial nerve and relevant Physiotherapeutic treatment. I have been informed about the mild inconvenience that I may experience due to any of the investigations.

I have been informed that any new information that may arise from this study will be conveyed to me for counseling and better management. I have been assured that the results of these tests will be kept strictly confidential.

I have read this consent form and have been given an opportunity to ask questions. Contents of this consent form were read out and explained to me in the local language in which I am conversant and I have signed this document after having understood the contents completely.

I, ----------, the undersigned, give my consent for participation of my/ my ward's own accord.

Signature of Patient/Guardian/ Participant **Signature of witness**

(Name & Address) **(Name & Address)**

Thumb Impression of Patient/Guardian

(In case of Illiterate)

(Name & Address)

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1. INTRODUCTION:

Bell's palsy is the most common form of acute spontaneous peripheral facial paralysis. It is an idiopathic, acute peripheral facial neuropathy, which presents as unilateral weakness or paralysis of the face . Its spontaneous recovery rate is high, and proper management results in a good prognosis without sequelae . The initial degree of facial paralysis has been regarded as one of the most important prognostic factors for recovery .

Many reports during the time of Corona pandemic show – Bell's palsy as a presenting symptom of COVID-19 caused by SARS-CoV-2.

In clinical practice, the degree of initial facial paralysis is determined by the House-Brackmann (H-B) grade, with lower H-B grade (less severe initial facial paralysis) being associated with a better prognosis or Sunny brook scale of Facial grading. Nonetheless, few studies to date have assessed clinical factors associated with favorable outcomes in patients subgrouped by the degree of initial paralysis or initial severity of facial weakness.

Facial nerve electrodiagnostics is a well-established and important tool for decision making in patients with facial nerve diseases. Electrophysiological analyses of the facial nerve and the mimic muscles can assist in diagnosis, assess the lesion severity, and aid in decision making. With acute facial palsy, it is a valuable tool for predicting recovery.

The facial nerve can be stimulated volitionally by the first motoneuron in the facial nerve nucleus, or artificially by electrostimulation of the peripheral facial nerve. A sequence of action potentials is then evoked, and the facial nerve is depolarized between the nodes of Ranvier. The action potentials are transmitted to the facial muscles via the motor endplates. A motor unit (MU) consists of a facial motoneuron and its innervated muscle fibers. In small facial muscles, the number of muscle fibers per MU is low. This is needed for the precise motor

control of the muscles. The activation of the muscle fibers by its motor neuron results in a motor unit action potential (MUAP). In facial electrodiagnostics, one normally measures the muscle response visually (NET, MST) or through the interpretation of the electrical signals derived from the muscle (ENoG, EMG). Unlike other nerves, direct analysis of only the facial nerve is not possible due to its early extratemporal branching. Most facial nerve injuries take place in the temporal bone. Nerve stimulation proximal to the pathologic lesion site is therefore often not feasible. Depending on the time after a facial nerve injury, electrodiagnostics cannot always differentiate between the three types of nerve injury. The significance of electrodiagnostics can be increased by repeated testing during the time course of a facial nerve lesion. If the lesion lies in the intratemporal segment such as Bell's palsy, it takes about 72 h before the Wallerian degeneration has reached the extratemporal segment distal to the stylomastoid foramen. Electrostimulation distal to the lesion site such as ENoG can show completely normal results during this 72-h window. The segment will continue to conduct the stimulus as it takes 10–14 days following an intratemporal insult before degeneration reaches the mimetic muscles. The final window of post-injury time is at 21 days post-onset. After this time, nerve excitability is definitively lost, and nerve degeneration is complete. Electrodiagnostic studies can be further complicated by the interference of first regenerating fibers, which is why ENoG is most valuable if initially performed 72 h post-onset and repeated several times until day 14–21. After neurotmesis, the degeneration of the muscle takes much longer.

While most are expected to recover, up to 29% of patients with Bell's palsy experience life-long residual weakness, involuntary contractions, spasms, and unintentional movements that occur simultaneously with intentional movement known as synkinesis.

Treatment options range from medications to physiotherapy.Electrical Stimulation (ES) is the commonly recommended treatment modality in Physiotherapy.ES can potentially reduce these

sequelae by preventing muscle atrophy and improving the selectivity of motor nerve regeneration. Interrupted Galvanic Current/ direct current, is one of the most common type of Electrical stimulation used in Bell's Palsy /IFP (Idiopathic facial palsy).It has a frequency of 30Hz and pulse duration >1Ms.Low voltage with Pulse durations from 300ms , 100 ms, 10 ms etc are used till a visible contraction in the target muscle is achieved. This is only to preserve the bulk of facial muscle and to prevent their atrophy until reinnervations or reconditioning completes.

Facial Exercises, Mime therapy, Facial Muscle Taping, Facial biofeedback exercises etc. are other treatment options which have been proven efficacious in cases of idiopathic bell's palsy.

Multimodal physiotherapy chosen on the basis of Degeneration idex and EMG findings can be a useful tool.

- Need for the study: Even though there are evidences regarding efficacy of various physiotherapeutic modalities in management of IFP, still electrical stimulation is the primary treatment physiotherapeutic choice in management of Bell's Palsy, anecdotal evidence suggests potential negative effects of electrical stimulation in increasing aberrant reinnervation and synkinesis. Clinicians are divided in their opinions regarding using physiotherapy for Idiopathic facial paralysis patients. There is a need to find a suitable scenario using electrophysiological studies to be able to guide the use of various physiotherapeutic options.

2. OBJECTIVE OF THE STUDY:

The objective of the present study is to categorise the extent of nerve damage based on electrophysiological studies in patients with idiopathic facial palsy. And thereafter provide physiotherapeutic treatment based on the degree of damage.

2.1 HYPOTHESIS

We intend to prove that tailored multimodal physiotherapy treatment based on electrophysiological findings will be efficacious in early recovery of patients with Idiopathic facial palsy , with nil or minimal long term complications.

3. LITERATURE REVIEW

BELL'S PALSY OR IDIOPATHIC FACIAL PALSY OVERVIEW

Sohyeon Kim, Minsung Kang, Jin-Sung Park, Hung Youl Seok 2023 [1] Carried out a retrospective study on population for incidence of bell's palsy before and after COVID-19 vaccination. They found that the vaccines, especially mRNA-based vaccines, may be associated with BP cases in young adults with certain distinctive clinical characteristics like taste changes, and have fast and good recovery.

Min Hee Kim & SoYoung Park 2021 [2] Evaluated the incidence and clinical characteristics of BP and assessed the effects of meteorological factors on its seasonal and monthly incidence. The results indicated that BP is more common among the elderly, and the incidence of BP is increasing due to an aging society, increased medical accessibility, and lifestyle changes. And this incidence was associated with low temperature and humidity; however, in the climate zone with extreme temperature and humidity differences between the coldest and hottest months, it

is assumed that the marked decrease in temperature (autumn) has more influence on the outbreak of BP than does the actual cold temperature (winter).

K K Adour, F M Byl, R L Hilsinger Jr, Z M Kahn, M I Sheldon 1978 [3] Studied a series of 1502 patients seen in their Facial Paralysis Research Clinic. 1048 were diagnosed as having Bell's palsy. Review of clinical, epidemiologic, and laboratory data, plus review of the literature, led them to conclude that Bell's palsy is an acute benign cranial polyneuritis probably caused by reactivation of the herpes-simplex virus, and the dysfunction of the motor cranial nerves (V, VII, X) may represent inflammation and demyelination rather than ischemic compression.

P P Devriese , T Schumacher, A Scheide, R H de Jongh, J M Houtkooper 1990 [4] Studied for over a 10-year period the diagnosis Bell's palsy, which was made in 1293 patients. They found out If denervation and poor recovery are to be prevented as far as possible, early examination and treatment of selected patients with prednisone is mandatory. An important factor in recovery is the age of the patient.

Tom Shokri , Shivam Patel , Kasra Ziai , Jonathan Harounian , Jessyka G Lighthall 2021 [5] Concluded that tailor made , multidisciplinary approach is necessary to develop a comprehensive treatment regimen that will result in optimal outcomes. Therapy should be tailored to the severity and pattern of synkinesis, and each patient approached on a case-by-case basis.

Orlando Guntinas-Lichius et. al. 2022 [6] Performed a systematic review on synkinesis. They found that a standardized assessment of the synkinetic symptoms and the individual synkinesis pattern is needed. The first-line treatment is facial training, followed by botulinum toxin. Surgery is reserved for individual cases with unsatisfactory first-line treatment.

J L Eekhof et. al. 2000 [7] Compared various electrodiagnostical tests in patients with hemifacial spasm and in patients who developed synkinesia after Bell's palsy. They examined the evoked blink reflexes in the orbicularis oculi (o. oculi) and orbicularis oris (o. oris) muscles in 23 patients with hemifacial spasm (HFS), in 10 patients with synkinesia after Bell's palsy (BPS) and in 22 control subjects and checked for any epaptic transmission. They found that alterations in facial nucleus excitability in both conditions, ectopic re-excitation of facial nerve axons in HFS may explain the differences in neurophysiological findings between HFS and BPS patients.

Ayşegül Gündüz, Nurten Uzun, Feray Karaali-Savrun, Meral E Kızıltan 2018 [8] studied the alterations in sensorimotor gating at brainstem after peripheral facial palsy (PFP). Suppression of R2 and R2c after prepulse stimulation is reduced in PFP suggesting decreased filtering of facial sensory input at brainstem level. Trigeminal sensitization at brainstem develops early after PFP.

Geraint Fuller, Cathy Morgan 2016 [9] concluded that Bell's palsy syndrome is a clinical diagnosis—made on positive clinical features with several exclusions. The long-term outcome from Bell's palsy syndrome is improved by prompt treatment with corticosteroids; severe facial weakness may recover better with co-treatment with antivirals. Lyme disease is the most common diagnostic mimic in endemic areas. Patients whose symptoms do not conform to Bell's palsy syndrome require further investigation.

Nobuyuki Mitsukawa , Hiroshi Moriyama, Kei Shiozawa, Kaneshige Satoh 2014 [10] In their study, they performed dissection of the terminal facial nerve branches that terminate in the orbicularis oculi muscle and orbicularis oris muscle and performed detailed examination of their courses. The results revealed 5 multiple anomalies not in conventional books, and the movements of the muscles might be compensated.

Ujwala R Newadkar, Lalit Chaudhari , Yogita K Khalekar [11] concluded that a multidisciplinary team approach (general practitioners, otolaryngologists, ophthalmologists, plastic surgeons, dental surgeons, physiotherapists, and psychologists) is essential when there is no prospect of further recovery of facial nerve function. Facial reanimation may be possible by a combination of static and dynamic surgical techniques and may result in functional as well as cosmetic improvements. The most common complication of surgery is postoperative hearing loss, which affects 3–15% of patients.

Stephen G Reich 2017 [12] Made a review on bell's palsy. He stated that Bell's palsy is characterized by the spontaneous acute onset of unilateral peripheral facial paresis or palsy in isolation, meaning that no features from the history, neurologic examination, or head and neck examination suggest a specific or alternative cause. In this setting, no further testing is necessary. Even without treatment, the outcome of Bell's palsy is favourable, but treatment with corticosteroids significantly increases the likelihood of improvement.

ROLE OF ELECTROPHYSIOLOGY IN IFP

Hasan Huseyin Arslan, Bulent Satar, Uzeyir Yildizoglu, Deniz Tuna Edizer, Hakan Akgun 2014 [13] Evaluated the validity of early (within 3 wk) and late-term (after 3 wk) electroneurography (ENoG) findings in Bell's palsy (BP) to predict the prognosis. They concluded ENoG and HB grading during first to fourth weeks of BP are useful prognostic indicators. Serial ENoG examinations are recommended to predict the status of neural degeneration and the prognosis of the palsy. However, ENoG in late term may not be compatible with clinical facial function.

Hayoung Byun et. al. 2013 [14] They did a prospective observational study to evaluate the prognostic and predictive value of electroneuronography (ENoG) in acute severe inflammatory

facial paralysis, including Bell's palsy and Ramsay Hunt syndrome (RHS). They found that A higher chance of recovery was expected with better ENoG in Bell's palsy and RHS. Based on our data, nonrecovery is predicted in patients with ENoG value greater than 82.5% in Bell's palsy, and 78% in RHS.

Lawrence C K Chow, Ricky C N Tam, M F Li 2002 [15] Conducted a prospective study to evaluate the use of electroneurography (ENOG) as a prognostic indicator in Bell's Palsy for Chinese patients in Hong Kong. ENOG was performed 5 to 14 days after the onset of facial palsy. The recovery of facial nerve function was documented by House and Brackmann grading. All the patients were followed up monthly until recovery or up to 6 months. They found it to be a useful prognostic indicator in Chinese patients with Bell's Palsy.

Poornachitra P and Arvind Muthukrishnan 2023 [16] Concluded that NCS should be mandatorily included as an assessment protocol in BP cases for quantification of nerve degeneration and as a prognostic tool during the treatment. They observed a greater amplitude loss in the orbicularis oris muscle innervated by buccal and mandibular branches of the facial nerve.

Zhengyi Cai et. al. 2017 [17] Compare clinical characteristics, electroneurography (ENoG) results, and functional outcomes of 80 patients with Bell's palsy (BP) and Ramsay Hunt syndrome (RHS). They found that patients with hypertension or diabetes mellitus had both higher final H-B grade and ENoG DI than those without the same comorbidity .Patients with RHS had poorer prognosis than those with BP.

Eman M Khedr et. al. 2018 [18] Evaluated the usefulness of a range of neurophysiological parameters to predict outcome in BP. They observed in 59 patients, that Facial nerve degeneration rate of frontalis muscle provides the most sensitive prognostic indicator of recovery from acute BP and may provide useful management strategies.

Sang Hoon Kim et. al. 2016 [19] In a retrospective study compared the prognostic value of different placements measured by electroneurography (ENoG) in Bell's palsy, especially among patients with poor results on ENoG. Their results suggest The results suggest that ENoG of the NLF has more prognostic value in the outcomes of Bell's palsy than ENoG of the oculi, with poorest results in patients with the NLF < 10%.

J Kimura, R L Rodnitzky, S H Okawara 1975 [20] Explained the electrophysiology behind aberrant regeneration after facial nerve paralysis. The blink reflex, ordinarily elicited only in the orbicularis oculi and not in other facial muscles, can be used to detect synkinetic movements objectively and these synkinetic movements ultimately will occur in nearly all cases following facial nerve degeneration provided that the facial nerve regenerates from a proximal site.

Patrizia Mancini et. al. 2014 [21] did a prospective case series to verify if one or more electrophysiological parameters could predict a risk of nonrecovery of normal facial function and the development of synkinesis in Bell's palsy (BP) subjects. They found out that BR and ENoG, considered together with clinical findings, could offer a good indication in the first phases of BP for the possibility to develop palsy residua. This combination of tests is well accepted by the subjects and is therefore suitable for multiple assessments in the early postpalsy period.

Myriam Loyo, Margaret McReynold, Jess C Mace, Michelle Cameron 2020 [22] Did a prospective, double-blinded, randomized, placebo-controlled study. Participants included adults with acute Bell's palsy with poor prognosis for full recovery due to complete paralysis or being over age 60. ES give was monophasic, high-volt pulsed waveform, 100μsec pulse duration, 35 hertz, motor-level intensity. The purpose of the study was to provide a protocol for future RCTs in Bell’s palsy.

FACIAL ASSESSMENT SCALES

Matthew Z Sun, Michael C Oh, Michael Safaee, Gurvinder Kaur, Andrew T Parsa 2012 [23] Stated that one of the important functions of the House-Brackmann grading scale is its ability to allow physicians to conveniently and precisely track the recovery of a patient's facial nerve function after injury. Substantial evidence suggests that the most important determinant of successful clinical outcome of the recovery of a peripheral nerve is time to reinnervation. The faster the end organ is reinnervated, the less likely it is to undergo atrophy and permanent denervation. The facial nerve's recovery after VS surgery can be similarly dependent upon the speed of immediate postoperative recovery.

Adel Y Fattah et. al. 2015 [24] They did a systematic review on various facial grading instruments. Facial nerve grading scales intend to provide objectivity and uniformity of reporting to otherwise subjective analysis. The Facial Nerve Grading Scale 2.0 requires further evaluation for intraobserver reliability. The Sunnybrook Facial Grading Scale has been robustly evaluated with respect to the criteria prescribed in this article. Although sophisticated technology-based methodologies are being developed for potential clinical application, the authors recommend widespread adoption of the Sunnybrook Facial Grading Scale as the current standard in reporting outcomes of facial nerve disorders.

J W House, D E Brackmann 1985 [25] Described the facial grading scale named after them. It was presented at the Annual Meeting of the American Academy of Otolaryngology-Head and Neck Surgery and the Facial Nerve Disorders Committee adopted a universal standard for grading facial nerve recovery. It has 6 grades and The Facial Nerve Disorders Committee has recommended that this system be used when the results of all facial nerve recoveries are

evaluated and reported. In this way there will be a universal understanding of the meaning of the results, and various forms of treatment can be better compared.

J Gail Neely, Nevin G Cherian, Cody B Dickerson, Julian M Nedzelski 2010 [26] Performed a prospective test of hypothesis about using SBFGS. They came up with the first report of specific criteria for completing the SB system. It is also the first in-depth description of the location within the system in which the majority of variances occur.

B R Ross, G Fradet, J M Nedzelski 1994 [27] They proposed FGS as an evaluative measure is simple and quick to administer, does not require any specialized equipment, and provides a quantitative score for reporting purposes. Most importantly, based on their results, their FGS is responsive to clinically important change. It succeeds in reporting results in a more continuous manner with a wider response range than the gross H-B grades. Each component of the grading system is sensitive to change and individually contributes to a change in the composite score.

CURRENT GUIDELINES FOR IDIOPATHIC FACIAL PALSY TREATMENT

John R de Almeida et. al. 2014 [28] They highlighted few key points as: Preliminary assessment of a patient with Bell palsy should include physical examination, to rule out other causes of facial weakness, and a grading of severity of weakness, to determine further treatment. Unless contraindicated, corticosteroids should be given to all patients with Bell palsy; antivirals may be considered for patients with severe to complete paresis. Patients with incomplete eye closure should be given eye protection, with lubricating drops and ointments, to prevent corneal damage. For patients with persistent or progressive facial weakness, imaging of the course of the facial nerve, referral to a specialist for further diagnostic considerations and referral to a facial therapist for facial physiotherapy should be considered.

J M K Murthy, Amrit B Saxena 2011 [29] Highlighted treatment guidelines for Bell's palsy. They mentioned that the aims of treatment in the acute phase of Bell's palsy include strategies to speed recovery and to prevent corneal complications. Eye care includes eye patching and lubrication, lubricating drops should be applied frequently during the day and a eye ointment should be used at night. Strategies to speed recovery include physical therapy, corticosteroids and antiviral agents.

Reginald F Baugh et. al. 2013 [30] proposed guidelines to improve the accuracy of diagnosis for Bell's palsy, to improve the quality of care and outcomes for patients with Bell's palsy, and to decrease harmful variations in the evaluation and management of Bell's palsy. The development group made a strong recommendation that (a) clinicians should assess the patient using history and physical examination to exclude identifiable causes of facial paresis or paralysis in patients presenting with acute-onset unilateral facial paresis or paralysis, (b) clinicians should prescribe oral steroids within 72 hours of symptom onset for Bell's palsy patients 16 years and older, (c) clinicians should not prescribe oral antiviral therapy alone for patients with new-onset Bell's palsy, and (d) clinicians should implement eye protection for Bell's palsy patients with impaired eye closure.

Michel Desmurget , FranCois Bonnetblanc, Hugues Duffau 2007 [31] They emphasises the concept of neural plasticity for functional recovery. While major irrevocable functional impairments are generally reported following acute injuries, a complete or nearly complete recovery is commonly observed in the context of slow-growing lesions. They mentioned that data associated with slow degenerative disease are also compatible with the idea that our brain possesses a very high potential for plasticity.

Gary S Gronseth , Remia Paduga 2012 [32] Reviewed evidence published since the 2001 American Academy of Neurology (AAN) practice parameter regarding the effectiveness,

safety, and tolerability of steroids and antiviral agents for Bell palsy. For patients with new-onset Bell palsy, steroids are highly likely to be effective and should be offered to increase the probability of recovery of facial nerve function (2 Class I studies, Level A) (risk difference 12.8%-15%). For patients with new-onset Bell palsy, antiviral agents in combination with steroids do not increase the probability of facial functional recovery by >7%. Because of the possibility of a modest increase in recovery, patients might be offered antivirals (in addition to steroids) (Level C).

C Hamlet, N Rumsey, H Williamson, K Johnson, C Nduka 2018 [33] Developed a collaborative three-round Delphi process which was aimed to identify priorities for future facial palsy research, from the perspective of clinicians, researchers, patients and carers. It also determined whether the research priorities of patients and carers aligned with those of health professionals and researchers. They concluded that establishing the research priorities in the field of facial palsy is a significant first step in ensuring that the future research agenda is focussed on topics that are considered important by both patients and health professionals.

Marc H Hohman 1, Tessa A Hadlock 2014 [34] Did a Retrospective chart review of 2000 patients. They found that Bell's palsy remains the most common facial palsy; females present more often for evaluation. Comprehensive diagnostic investigation is mandatory in atypical cases, and thorough management must be multidisciplinary.

PHYSIOTHERAPEUTIC MODALITIES FOR MANAGEMENT OF BELL'S PALSY

Teresa Paolucci et. al. 2020 [35] Did a double blinded, RCT to determine the effects of neurocognitive-rehabilitative approach through mirror-therapy (MT) and motor-imagery (MI), integrated into the traditional rehabilitation with mime-therapy and myofascial-approach. They concluded that an integrated use of MT and MI is efficacious in the rehabilitation of FNP,

improving facial physical function. Further studies are needed to determine the predictive factors of the recovery of facial mimic.

Katsuhiko Nakamura, Naoki Toda, Koichiro Sakamaki, Kenji Kashima, Noriaki Takeda 2003 [36] Developed a new training method of biofeedback rehabilitation for the prevention of synkinesis after facial palsy and evaluated the efficacy of the training. The aim of their training method was to prevent eye closure during mouth movements; moreover, synkinesis has various symptoms such as mouth movements during blinking and platysma contraction during eating. It is thought that prophylactic biofeedback rehabilitation, if it were designed for the prevention of a certain synkinesis, would be effective for preventing the development of the certain synkinesis after facial palsy.

Carien H G Beurskens, Peter G Heymans 2006 [37] Studied the effect of mime therapy on facial symmetry and severity of paresis in people with facial nerve paresis. The results support our hypothesis that mime therapy substantially improves facial symmetry in people with long-term facial nerve paresis. There were greater improvements in the Sunnybrook Facial Grading System for all three components of facial symmetry in the group that received mime therapy compared with the group on the waiting list.

Takashi Kasahara et. al. 2017 [38] In their study on taping in FNP, they concluded the reinforcement of sensory information from the taped skin using their new biofeedback therapy might affect cortical plasticity and lead to functional improvements. However, little is known about the network dynamics underlying connectivity changes after biofeedback exercise with FNP.

Lázaro J Teixeira , Juliana S Valbuza, Gilmar F Prado 2011 [39] Evaluated physical therapies for Bell's palsy by searching various data bases. They concluded that there is no high quality evidence to support significant benefit or harm from any physical therapy for idiopathic

facial paralysis. There is low quality evidence that tailored facial exercises can help to improve facial function, mainly for people with moderate paralysis and chronic cases. There is low quality evidence that facial exercise reduces sequelae in acute cases. The suggested effects of tailored facial exercises need to be confirmed with good quality randomised controlled trials.

Keishi Fujiwara, Yasushi Furuta, Naoko Yamamoto, Kanako Katoh, Satoshi Fukuda 2018 [40] They investigated factors affecting the effect of physical rehabilitation therapy for synkinesis as a sequela to facial nerve palsy. Physical rehabilitation was shown to prevent significant deterioration in synkinesis in female and younger patients with facial nerve palsy. Careful follow-up with regard to synkinesis is required in cases in which the facial nerve damage is thought to be severe.

4. MATERIAL AND METHODS

- Patients (both gender) diagnosed with acute onset of Bell's palsy (< 30days) with no other identified cause of facial palsy and referred by Neurophysician to the Department of Physiotherapy will be considered.
- Inclusion criteria:
    - Idiopathic Facial Paralysis < 30 days duration
    - Age 10 years to 59 years
    - No history of recurrent IFP
- Clinical data including demographics and the presence of common comorbid disease such as hypertension (HTN) or diabetes mellitus (DM) will be recorded.
- All the patients will undergo Facial Nerve Conduction test (ENoG), Blink Reflex analysis and functional outcomes evaluation with House–Brackmann (H-B) grading

system and Sunny Brook Scale and 3T MRI brain along with constructive interference in steady state (CISS) protocol for facial nerve.

- Degeneration index/ Electroneurographic quotient will be calculated from Amplitude values in electroneurography.
- The Degeneration Index (DI) was calculated as: [100 – (ENoG amplitude affected/unaffected side) X 100].
- Recruitment: Around 100 patients through convenient sample and then based on their DI, they will be categorised in either of the 3 groups for multimodal physiotherapeutic treatment.
- Assessments: Each patient will undergo electrophysiological studies at the time of admission, day 10-14 of onset of IFP, then subsequently after every 21 days till 6 months or complete recovery.
- Patients will be categorised into groups according to their DI
- A tailor made multimodal physiotherapy will be given to each patient.

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